

Heat Resistant Paint (HRP) for Cheetah Helicopters



सीएसआईआर
CSIR
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The Innovation Engine of India

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SCIENCE FOR A SAFER TOMORROW

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Heat Resistant Paint (HRP)

for Main Rotor Blades of Cheetah, Chetak & Cheetal Helicopters

Indigenous speciality coating for aerospace and defence applications



HIGHER RELIABILITY
LONGER SERVICE LIFE
MISSION READINESS
AT EXTREME CONDITIONS

PROTECTING THOSE WHO PROTECT INDIA

THE NEED

Metallic main rotor blades can experience skin/core de-bonding in the region exposed to hot engine exhaust. HRP was developed to prevent de-bonding while maintaining coating integrity under demanding service conditions.

THE TECHNOLOGY

- ✓ Single-part silicone-based heat resistant paint
- ✓ Service temperature range: -70 °C to 400 °C
- ✓ Thermal insulation with erosion and corrosion resistance
- ✓ Applicable on aluminium, steel and composite substrates
- ✓ Spray applicable; matt finish



KEY HIGHLIGHTS

PROVEN PERFORMANCE FOR OPERATIONAL READINESS



ΔT > 100 °C

Demonstrated on
0.2 – 0.5 mm Al 2024 alloy

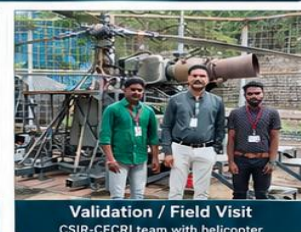


3 HRP-coated MRBs

Dynamic de-bonding test:
no de-bonding observed



All listed qualification tests passed



QUALIFICATION & TEST SUMMARY

ALL TESTS PASSED AS PER APPLICABLE STANDARDS

Functional Tests – PASSED

- ✓ Solvent resistance
- ✓ Tape resistance
- ✓ Thermal gradient (ΔT) test
- ✓ Dynamic MRB de-bonding test

Liquid HRP Tests – PASSED

- ✓ Condition of HRP
- ✓ Odor test
- ✓ VOC
- ✓ Shelf life
- ✓ Pot life & viscosity
- ✓ Application
- ✓ Drying time
- ✓ Density of HRP
- ✓ Accelerated storage stability

Coating Tests – PASSED

- ✓ Color
- ✓ Specular gloss
- ✓ Appearance of HRP coating
- ✓ Dry film thickness
- ✓ Bend / flexibility test (room temperature)
- ✓ Bend test (low temperature)
- ✓ Adhesion (cross hatch)
- ✓ Adhesion (dolly test)
- ✓ Hardness (scratch test)
- ✓ Water resistance
- ✓ Fuel resistance
- ✓ Gearbox oil resistance
- ✓ Hydraulic oil resistance
- ✓ Grease resistance
- ✓ Weather resistance

Environmental Tests – PASSED

- ✓ High temperature
- ✓ Low temperature
- ✓ Salt spray
- ✓ Combined altitude, temperature & humidity (CATH)
- ✓ Resistance to dust
- ✓ Driving rain
- ✓ Icing / freezing rain
- ✓ Thermal shock
- ✓ Humidity resistance
- ✓ Vibration test



Status: Provisional clearance obtained for further testing on main rotor blades. Final CEMILAC/RCMA certification and technology transfer activities are under progress.

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